

What Is Claimed Is:

1. A method of manufacturing a copper interconnects on a semiconductor wafer comprising:

polishing a copper interconnect layer to form said copper interconnects, said polishing step including the use of a slurry that contains BTA;

cleaning said semiconductor wafer;

exposing said semiconductor wafer to a H-S-R solution to form a S-R layer over said copper interconnects; and

depositing a layer of dielectric material over said semiconductor wafer after removing said S-R layer with an in-situ plasma pretreatment of said semiconductor wafer with a hydrogen containing plasma.

2. The method of Claim 1 wherein said cleaning step and said exposing step are performed in-situ.

3. The method of Claim 1 wherein said hydrogen containing plasma is  $\text{NH}_3$ .

4. The method of Claim 1 wherein said exposing step comprises dipping said semiconductor wafer in said H-S-R solution.

5. The method of Claim 1 wherein said exposing step comprises spraying said semiconductor wafer with said H-S-R solution.

6. The method of Claim 1 wherein said S-R layer is a monolayer.
7. The method of Claim 1 wherein  $R = C_nH_{2n+1}$ .
8. The method of Claim 7 wherein  $n = 16$ .
9. The method of Claim 7 wherein  $12 < n < 25$ .
10. The method of Claim 1 wherein said slurry also contains an H-S-R solution.
11. A method of manufacturing copper interconnects on a semiconductor wafer comprising:
  - forming a S-R layer over said copper interconnects by polishing a copper interconnect layer with a slurry that includes H-S-R;
  - cleaning said semiconductor wafer;
  - exposing said semiconductor wafer to a H-S-R solution; and
  - depositing a layer of dielectric material over said semiconductor wafer after removing said S-R layer with an in-situ plasma pretreatment of said semiconductor wafer with a hydrogen containing plasma.
12. The method of Claim 11 wherein said hydrogen containing plasma is  $NH_3$ .
13. The method of Claim 11 wherein said forming step, said cleaning step, and said exposing step are performed in-situ.

14. The method of Claim 11 wherein said cleaning step and said exposing step are performed in-situ.

15. The method of Claim 11 wherein said exposing step comprises dipping said semiconductor wafer in said H-S-R solution.

16. The method of Claim 11 wherein said exposing step comprises spraying said semiconductor wafer with said H-S-R solution.

17. The method of Claim 11 wherein  $R = C_nH_{2n+1}$ .

18. The method of Claim 17 wherein  $n = 16$ .

19. The method of Claim 17 wherein  $12 < n < 25$ .

20. The method of Claim 11 wherein said S-R layer is a monolayer.

21. A method of manufacturing copper interconnects on a semiconductor wafer comprising:

forming said copper interconnects by polishing a copper interconnect layer with a slurry that includes H-S-R, said polishing step also forming a S-R layer over said copper interconnects;

cleaning said semiconductor wafer; and

depositing a layer of dielectric material over said semiconductor wafer after removing said S-R layer with an in-situ plasma pretreatment of said semiconductor wafer with a hydrogen containing plasma.

22. The method of Claim 21 wherein said slurry further includes BTA.

23. The method of Claim 21 wherein said hydrogen containing plasma is  $\text{NH}_3$ .

24. The method of Claim 21 wherein said forming step and said cleaning step are performed in-situ.

25. The method of Claim 21 wherein  $\text{R} = \text{C}_n\text{H}_{2n+1}$ .

26. The method of Claim 25 wherein  $n = 16$ .

27. The method of Claim 25 wherein  $12 < n < 25$ .

28. The method of Claim 25 wherein R is an organic ligand with a carbon length  $\geq 16$ .

29. The method of Claim 21 wherein said S-R layer is a monolayer.

30. A method of manufacturing a copper interconnects on a semiconductor wafer comprising:

forming said copper interconnects by polishing a copper interconnect layer with a slurry that includes  $\text{HSC}_{16}\text{H}_{33}$ , said polishing step also forming a S-R monolayer over said copper interconnects;

cleaning said semiconductor wafer;

dipping said semiconductor wafer in a solution containing  $\text{HSC}_{16}\text{H}_{33}$ , said dipping step performed in-situ with said cleaning step; and

depositing a layer of dielectric material over said semiconductor wafer after removing said S-R monolayer with an in-situ plasma pretreatment of said semiconductor wafer with a  $\text{NH}_3$  plasma.